



## SHORT COMMUNICATION

# New records of the Critically Endangered frog *Pristimantis pardalinus* (Craugastoridae) in the eastern Andean slopes of central Peru

<sup>1,2</sup>Rudolf von May

<sup>1</sup>Department of Ecology and Evolutionary Biology, University of Michigan, 2051 Ruthven Museums Building, 1109 Geddes Avenue., Ann Arbor, Michigan 48109, USA <sup>2</sup>Museum of Vertebrate Zoology, University of California, Berkeley, 3101 Valley Life Sciences Bldg., Berkeley, California 94720, USA

**Key words.** Andes-Amazon, bromeliad, cloud forest, endemic, phytotelmata, Red List

**Citation:** von May R. 2016. New records of the Critically Endangered frog *Pristimantis pardalinus* (Craugastoridae) in the eastern Andean slopes of central Peru. *Amphibian & Reptile Conservation* 10(1) [Special Section]: 13–16 (e117).

**Copyright:** © 2016 von May. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits unrestricted use for non-commercial and education purposes only, in any medium, provided the original author and the official and authorized publication sources are recognized and properly credited. The official and authorized publication credit sources, which will be duly enforced, are as follows: official journal title *Amphibian & Reptile Conservation*; official journal website <[amphibian-reptile-conservation.org](http://amphibian-reptile-conservation.org)>.

**Received:** 25 November 2015; **Accepted:** 12 April 2016; **Published:** 20 May 2016

The eastern slopes of the Andes exhibit high levels of amphibian diversity and endemism coupled with diverse ecosystems and steep elevational gradients (Catenazzi and von May 2014). In central Peru, high-elevation ecosystems such as the Andean grassland, montane scrubland, and the upper cloud forest have experienced high levels of habitat loss and degradation, potentially affecting many amphibian species (Lehr and von May 2004; von May et al. 2008). Conservation of key areas along these Andean slopes is a priority because the type localities of many amphibian species described a long time ago (e.g., Boulenger 1912), or more recently (e.g., Lehr et al. 2006), remain unprotected. Equally important is to resurvey these sites to determine if species that have not been seen in decades are still there (e.g., Lehr and von May 2004; Lehr 2007), to assess their current population status and identify threats to their survival. This is especially critical for endemic and range-restricted species, many of which are vulnerable to local threats such as habitat loss and disease.

One example of such endemic and range-restricted species is *Pristimantis pardalinus*, a terrestrial breeding frog known from a single locality in central Peru (Lehr et al. 2006). A recent assessment focusing on the extinction risk of 39 potentially threatened amphibian species in Peru (Jarvis et al. 2015) determined that *P. pardalinus*, which was previously categorized as Data Deficient

(DD) according to the International Union for Conservation of Nature Red List (IUCN 2012a), should be categorized as Critically Endangered (CR). Given that the species was known from a single locality, had a small Extent of Occurrence (EOO <100 km<sup>2</sup>), and faced ongoing threats (e.g., agricultural expansion, overgrazing, and human settlement), the status of *P. pardalinus* was “up-listed” from DD to CR B1ab(iii) (IUCN 2014). Though the change in the conservation status of this species, which resulted from the application of the IUCN Red List Categories and Criteria (IUCN 2012b), was an important step, Jarvis et al. (2015) emphasized that additional field assessments are needed in order to understand the geographic distribution, population size, and threats affecting this and many other species.

In this report, I provide new distributional data for *P. pardalinus* based on field observations and the collection of voucher specimens. I used the morphological diagnoses provided by Lehr et al. (2006) to identify specimens and took measurements to the nearest 0.1 mm with calipers under a stereomicroscope. Specimens were deposited in the Herpetological Collection of the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru (MUSM) and in the Herpetological Collection of the Museum of Vertebrate Zoology, University of California, Berkeley, California, USA (MVZ).

On 14 March 2014, two field assistants and I surveyed five sites located 10–15 km E-SE from Huasahuasi, the

**Correspondence.** Email: [rvonmay@gmail.com](mailto:rvonmay@gmail.com)





**Fig. 1.** Map showing the currently known distribution of *Pristimantis pardalinus*. The yellow triangle indicates the location of the type locality and the red stars indicate the location of new records reported in this study. The inset shows the location of the study area in Peru (red box).

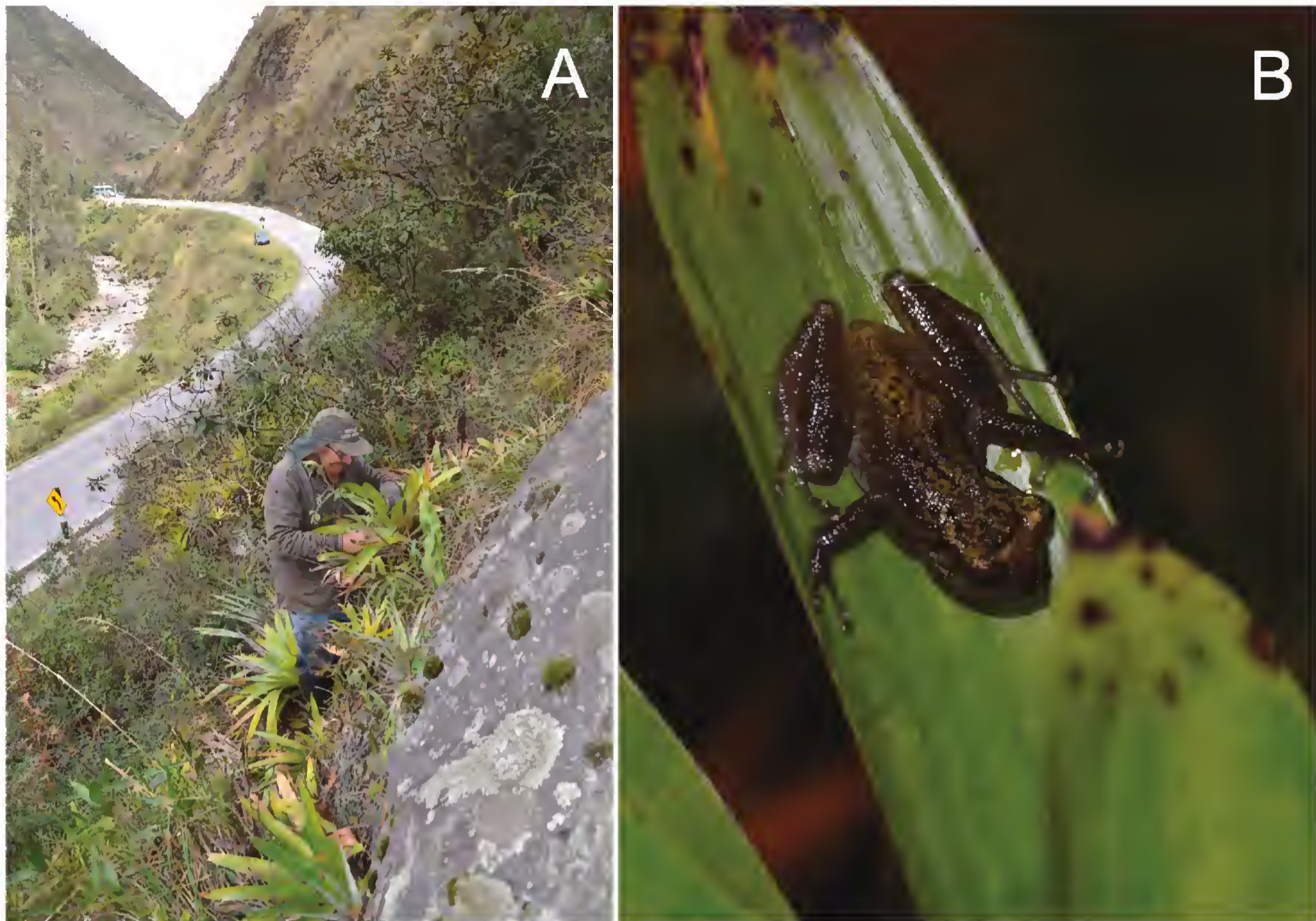
type locality of *P. pardalinus* (Fig. 1). We focused our search on hillsides located next to the Carretera Central road, Palca District, Tarma Province (Fig. 2). The habitat at the selected sites was a mix of scrubland dominated by terrestrial bromeliads and Peruvian feather grass; two sites also had small patches of cloud forest vegetation. Altogether, we inspected approximately 150 terrestrial bromeliads between 9:00 h and 16:00 h, and found seven individuals of *P. pardalinus* at two sites. All individuals were found inside bromeliads of the genus *Tillandsia*. These bromeliads are commonly distributed along various sections of the road connecting Palca and San Ramón, as well as the road connecting the Carretera Central and Huasahuasi (Fig. 2). One individual (MUSM 33278) was collected from the first site ( $11^{\circ}19'15.78''\text{S}$ ,  $75^{\circ}33'07.81''\text{W}$ ) at 2,702 m elevation and six individuals (MUSM 33279-33281; MVZ 272273-272275) were collected from the second site ( $11^{\circ}17'17.77''\text{S}$ ,  $75^{\circ}33'47.77''\text{W}$ ) at 2,591 m elevation. Morphometric data for all specimens are shown in Table 1. We surveyed three additional sites along the Carretera Central (section connecting Palca and San Ramón) and one site along the road connecting the Carretera Central and Huasahuasi (the type locality), but did not find additional individuals of *P. pardalinus* (Fig. 1).

This report represents an extension of >10 km of the known geographic range of *P. pardalinus*, based on spec-

imens collected 10.56 km and 12.96 km, respectively, from the type locality. Furthermore, I note that the elevation given in the species description, 2,640 m, was in error. A recent inspection of satellite images provided by Google Earth and Fallingrain, a Global Gazetteer, indicate that the holotype and paratopotypes of *P. pardalinus* were actually collected at ca. 2,800 m a.s.l. Therefore, the currently known elevational distribution of *P. pardalinus* ranges from 2,591 to 2,800 m a.s.l. Given that the three known localities of *P. pardalinus* are situated outside protected areas, the long-term conservation of this species will depend on the type of land use at these localities. This is especially relevant considering that large areas of potentially suitable habitat have already been converted to cultivated land (Huasahuasi is one of the main potato production centers in Peru). Thus, *P. pardalinus* should be considered a species of special concern (von May et al. 2008) and the protection of the remaining habitats in the region should be included in future initiatives directed by the Servicio Nacional Forestal y de Fauna Silvestre (SEFOR), Peru's Wildlife Service.

**Acknowledgments.**—I thank Jesús H. Córdova Santa Gadea, Director of the Herpetological Collection of the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru and Carol Spencer, Curator of the Herpetological Collection of the Mu-





**Fig. 2.** Local collaborator Elmer Mapelli surveying bromeliads on rocky outcrop along the Carretera Central, Palca District, Tarma Province, 2,591 m elevation (A). Six individuals of *P. pardalinus*, including MVZ 272273 (B), were found at this site.

seum of Vertebrate Zoology, University of California, Berkeley, California, USA, for providing access to the herpetological collections at each institution. I thank Elmer Mapelli and Patricio Valverde for assistance in the field. Research and collecting permits were issued by the Ministry of Agriculture in Peru (Resolución Directoral N° 120-2012-AG-DGFFS-DGEFFS y Resolución Directoral N° 064-2013-AG-DGFFS-DGEFFS). I thank Jes-

sica Deichmann and an anonymous reviewer for providing helpful comments on the manuscript. Fieldwork in central Peru was supported by grants from the National Science Foundation (Postdoctoral Research Fellowship in Biology, DBI-1103087) and the National Geographic Society Committee for Research and Exploration (Grant # 9191-12).

**Table 1.** Measurements (in mm) of individuals of *Pristimantis pardalinus* found in this study. Individual collection number and sex noted for each individual. SVL = snout-vent length, TL = tibia length, FL = foot length, HL = head length, HW = head width, ED = eye diameter, TY = tympanum diameter, IOD = interorbital distance, EW = upper eyelid width, IND = internarial distance, E-N = eye-nostril distance.

	<b>MUSM 33278</b>	<b>MUSM 33279</b>	<b>MUSM 33280</b>	<b>MUSM 33281</b>	<b>MVZ 272273</b>	<b>MVZ 272274</b>	<b>MVZ 272275</b>
<b>Character</b>	<b>male</b>	<b>male</b>	<b>juvenile</b>	<b>male</b>	<b>female</b>	<b>male</b>	<b>juvenile</b>
<b>SVL</b>	25.00	24.60	20.82	24.84	30.03	25.28	20.69
<b>TL</b>	12.61	12.49	10.21	11.96	16.99	12.17	10.29
<b>FL</b>	10.53	10.88	8.68	10.79	14.97	10.67	8.13
<b>HL</b>	9.28	8.33	7.02	8.58	10.80	8.53	6.84
<b>HW</b>	9.15	9.30	7.44	9.29	11.49	8.89	7.45
<b>ED</b>	3.13	3.20	2.24	3.45	3.50	3.63	2.43
<b>TY</b>	1.27	1.24	0.97	1.45	1.61	1.71	0.97
<b>IOD</b>	3.36	2.92	2.62	3.34	4.36	3.26	2.66
<b>EW</b>	2.05	2.22	1.94	2.20	2.50	2.31	1.93
<b>IND</b>	2.04	2.05	1.56	2.04	2.41	2.11	1.36
<b>E-N</b>	2.82	2.64	2.09	2.80	3.64	2.70	2.16



## Literature Cited

- Barrio-Amorós CL, Fuentes O. 2012. The herpetofauna of Peru. *AmphibiaWeb*. 2015. AmphibiaWeb: Information on amphibian biology and conservation. Berkeley, California, USA. Available: <http://amphibiaweb.org> [Accessed: 20 November 2015].
- Boulenger GA. 1912. Descriptions of new batrachians from the Andes of South America, preserved in the British Museum. *Annals Magazine Natural History* 10(56): 185–191.
- Catenazzi, A, von May R. 2014. Conservation status of amphibians in Peru. *Herpetological Monographs* 28: 1–23.
- Duellman WE, Lehr E. 2009. *Terrestrial-Breeding Frogs (Strabomantidae) in Peru*. Natur- und Tier-Verlag, Naturwissenschaft, Münster, Germany. 382 pp.
- IUCN (International Union for Conservation of Nature and Natural Resources). 2012a. *IUCN Red List of Threatened Species, Version 2012.2*. International Union for the Conservation of Nature, Switzerland. Available: <http://www.iucnredlist.org> [Accessed: 07 October 2013].
- IUCN. 2012b. *IUCN Red List Categories and Criteria: Version 3.1*. Second edition. Gland, Switzerland, and Cambridge, United Kingdom: IUCN. Iv + 32 p.
- IUCN SSC Amphibian Specialist Group. 2014. *Pristimantis pardalinus*. The IUCN Red List of Threatened Species 2014: e.T136132A43291649. Available: <http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T136132A43291649.en> [Accessed: 25 November 2015].
- Jarvis L, Angulo A, Catenazzi A, von May R, Brown JL, Lehr E, Lewis J. 2015. A re-assessment of priority amphibian species of Peru. *Tropical Conservation Science* 8(3): 623–645.
- Lehr E. 2007. Rediscovery of *Phrynopus peruanus* Peters 1874 (Amphibia, Anura, Leptodactylidae). *Zootaxa* 1485: 51–57.
- Lehr E, Lundberg M, Aguilar C, von May R. 2006. New species of *Eleutherodactylus* (Anura: Leptodactylidae) from the eastern Andes of central Peru with comments on central Peruvian *Eleutherodactylus*. *Herpetological Monographs* 20: 105–128.
- Lehr E, von May R. 2004. Rediscovery of *Hyla melano-pleura* Boulenger, 1912 (Amphibia: Anura: Hylidae). *Salamandra* 40(1): 51–58.
- von May R, Catenazzi A, Angulo A, Brown JL, Carrillo J, Chávez G, Córdova JH, Curo A, Delgado A, Enciso MA, Gutiérrez R, Lehr E, Martínez JL, Medina-Müller M, Miranda A, Neira DR, Ochoa JA, Quiroz AJ, Rodríguez DA, Rodríguez LO, Salas AW, Seimon T, Seimon A, Siu-Ting K, Suárez J, Torres C, Twomey E. 2008. Current state of conservation knowledge on threatened amphibian species in Peru. *Tropical Conservation Science* 1: 376–396.



**Rudolf von May** is a postdoctoral research fellow at the Department of Ecology and Evolutionary Biology at the University of Michigan. His current research seeks to understand how amphibian and reptile communities are structured across habitats and elevations, taking into account the phylogenetic relatedness among species present in those communities.